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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,515	09/16/2003	Takashi Matsuoka	96790P439	5830

8791 7590 08/16/2005

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EXAMINER

GOLUB, MARCIA A

ART UNIT PAPER NUMBER

2828

DATE MAILED: 08/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/665,515	MATSUOKA ET AL.	
	Examiner	Art Unit	
	Marcia A. Golub	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

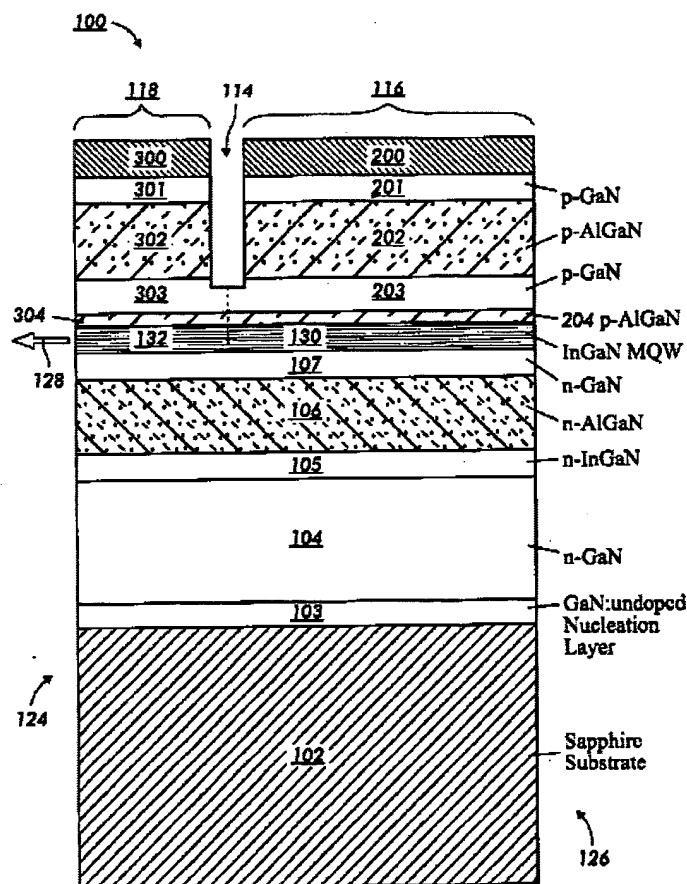
- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/16/03, 3/18/05, 5/31/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351 (a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**FIG. 4B**

Claims 1-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Kneissl et al. (U.S.Pat. 6,526,083).

Regarding **claims 1-3, 11, and 12**, Fig. 4B of Kneissl discloses "a laser [116] with an optical modulator [118], which are integrated on a single substrate [102] wherein optical modulator comprises:

a lower cladding layer of a first conductivity type [106, n-type]; a light absorption layer [108] which is formed on said lower cladding layer and has a quantum-well structure constituted by a quantum-well layer and a barrier layer [column 5 lines 12-18 and column 7 lines 22-25]; and an upper cladding layer [110, p-type] of a second conductivity type formed on said light absorption layer,

wherein the quantum-well layer is made of $\text{In}_{1-x-y}\text{Ga}_x\text{Al}_y\text{N}$ ($0 \leq x, y \leq 1$, $0 \leq x+y \leq 1$) [InGaN when $x=1$, $y=0$, column 5 lines 12-13], the barrier layers is made of $\text{In}_{1-x'-y'}\text{Ga}_{x'}\text{Al}_{y'}\text{N}$ ($0 \leq x', y' \leq 1$, $0 \leq x'+y' \leq 1$) [GaN when $y'=0$, $x'=1$, column 5 line 17],

and an optical waveguide having a light incident end is constituted by said lower cladding layer, said light absorption layer, and said upper cladding layer. [optical waveguide structure is inherent to optical modulators]

wherein said light absorption layer includes a multiple-quantum-well structure [column 5 lines 12-18],

wherein said lower cladding layer is formed on a predetermined substrate" [102]

Regarding **claims 4-6 and 13-15**, Kneissl discloses a nitride semiconductor device as described above with inherent polarization properties "wherein polarization is produced in said light absorption layer in the absence of a bias, wherein the polarization

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is spontaneous polarization produced in said light absorption layer, wherein the polarization is the sum of spontaneous polarization and piezoelectric polarization produced in said light absorption layer."

Spontaneous and piezoelectric polarizations are effects that occur due to the structure and composition of the materials and not due to applied voltage. Spontaneous polarization occurs due to wurtzite structure of nitride-based III-V semiconductors. Since both InN and InGaN materials have wurtzite structure, spontaneous polarization occurs in the active layer. Piezoelectric polarization occurs due to the compressive strain in the material that results from the lattice mismatch between different layers. Since the lattice constant of InGaN is larger than the lattice constant of GaN, quantum well layer is compressively strained producing piezoelectric polarization in the same direction as spontaneous polarization. Therefore the total polarization is the sum of spontaneous and piezoelectric polarization.

Regarding **claims 7, 8, 16, and 17**, Kneissl discloses everything claimed, as applied above, in addition "the quantum-well layer and the barrier layer have different lattice constants, wherein the quantum-well layer has a larger lattice constant than the barrier layer [InGaN has a larger lattice constant than GaN, column 5 lines 12-18].

Regarding **claims 9, 10, 18, and 19** Kneissl discloses a nitride semiconductor device as described above wherein the quantum well layer comprises InGaN and barrier layer comprises GaN. Even though the reference does not disclose the specific composition of InGaN, it is well known in the art that the composition of ternary

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compounds varies according to the formula $A_xB_{1-x}C$ $0 \leq x \leq 1$. Therefore, the reference inherently discloses the quantum well layer comprising $\text{In}_x\text{Ga}_{1-x}\text{N}$, and in the case of $x=1$ the quantum well layer can be InN . Also, since the concentration of In and Ga can vary from 0 to 1 quantum well layer material can have different lattice constants. Therefore, the quantum-well layer can have a smaller lattice constant than the barrier layer.

Fax/Telephone Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcia A. Golub whose telephone number is 571-272-0218. The examiner can normally be reached on M-F 8-5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAG


Zandra Smith